

REMARKS/ARGUMENTS

I. General Remarks and Disposition of the Claims.

Claims 1-46 are pending in this application. Claims 44-46 have been allowed. Claims 1, 9, 12-13, 19, 21-23, 32, 35-36, 42, and 44-46 are amended herein.

All the above amendments are made in a good faith effort to advance the prosecution on the merits of this case. Applicants respectfully request that the above amendments be entered, and further request reconsideration in light of the amendments and remarks contained herein.

None of these amendments is made for reasons related to the patentability of the claims, but rather to clarify the invention. Applicants reserve their rights to take up prosecution on the claims as originally filed in this or an appropriate continuation, continuation-in-part, or divisional application.

II. Statement of Common Ownership.

The present application (U.S. App. No. 10/643,266) and U.S. Application No. 10/304,430 (U.S. Pub. No. 2004/0211568) were, at the time the invention of the present application was made, owned by, or subject to an obligation of assignment to, Halliburton Energy Services, Inc.

III. Remarks Regarding the Rejection of Claims 21-23 Under 35 U.S.C. 102(e).

A. The *Funkhouser* Publication Does Not Teach or Suggest Each and Every Limitation of Claims 21-23 as Required to Anticipate This Claim.

The Examiner has rejected claims 21-23 “under 35 U.S.C. 102(e) as being anticipated by Funkhouser et al. (2004/0211568)” (hereinafter “the *Funkhouser* Publication”). (Office Action at 2). With respect to the *Funkhouser* Publication, the Examiner has stated:

Funkhouser et al. disclose a method of fracturing a subterranean zone penetrated by a well bore having a temperature up to and above 400 degrees Fahrenheit comprising pumping a viscous aqueous fracturing fluid into the subterranean zone at a rate and pressure sufficient to fracture the zone the fluid comprising: water; a terpolymer of 60 weight % of 2-acrylamido-2-methylpropane-sulfonic acid, 39.5 weight % of acrylamide and 0.5 weight % of acrylic acid present in the *foamed* fracturing fluid in an amount of about 0.75% by weight of the water; carbon dioxide present in the *foamed* fracturing fluid in an amount of from about 20% to about 70% by volume of the *foamed* fracturing fluid, a cocoamidopropyl

betaine foaming agent present in the *foamed* fracturing fluid in an amount of about 0.6% by weight of the water; a sodium bromate viscosity breaker in the fluid in an amount of about 0.35% by weight of the water; the *foamed* fracturing fluid is a tetrakis(triethanolaminate)zirconium(IV) cross-linking agent present in the *foamed* fracturing fluid in an amount of about 0.5% by weight of water; and the *foamed* fracturing fluid is an acetic acid-acetate buffer present in the fluid in an amount of about 0.5% by weight of the water.

(Office Action at 2-3) (emphasis added).

To anticipate a claim, a reference must teach or suggest each and every claim limitation. MANUAL OF PATENT EXAMINING PROCEDURE § 2131 (8th ed., rev. 2, May 2004) (hereinafter “MPEP”). Since the *Funkhouser* Publication does not teach or suggest each and every limitation of claims 21-23, Applicants respectfully submit that it does not anticipate claims 21-23.

In particular, independent claim 21 recites the use of an “aqueous foamed fracturing fluid comprising . . . carbon dioxide gas . . . [and] a cocoamidopropyl betaine foaming agent.” Rather than disclosing an aqueous foamed fracturing fluid, the *Funkhouser* Publication discloses the use of fracturing fluids comprised of water, a terpolymer of 2-acrylamido-2-methylpropane sulfonic acid, acrylamide, acrylic acid, a cross linking agent, and a delayed viscosity breaker without disclosing the cocoamidopropyl foaming agent or carbon dioxide gas present in the foamed fracturing fluid as recited in independent claim 21. (*Funkhouser* Pub. ¶¶ 21, 23). The *Funkhouser* Publication thus does not teach or suggest an aqueous foamed fracturing fluid comprising carbon dioxide gas and a cocoamidopropyl betaine foaming agent.

Therefore, Applicants respectfully assert that independent claim 21 is not anticipated by the *Funkhouser* Publication. Claims 22 and 23 depend either directly or indirectly on independent claim 21. All these dependent claims, which include all the limitations of their corresponding independent claims, are allowable for at least the reasons cited above with respect to independent claim 21. Accordingly, the Applicants respectfully request withdrawal of this rejection with respect to claims 21-23.

IV. Remarks Regarding the Rejection of Certain Claims Under 35 U.S.C. § 103.

A. Claims 1, 2, 6, 7, 12, 13, 24, 25, 29, 30, 35, and 36 Are Not Obvious in View of *Stahl* and *Mitchell*.

The Examiner has rejected “[c]laims 1, 2, 6, 7, 12, 13, 24, 25, 29, 30, and 36 . . . under 35 U.S.C. 103(a) as being unpatentable over Stahl et al. (4951921) [hereinafter “*Stahl*”] in view of Mitchell et al. (6242390) [hereinafter “*Mitchell*”]” (Office Action at 3). With respect to *Stahl*, the Examiner has stated:

Stahl et al disclose a method of fracturing (col. 5, line 35) a subterranean zone penetrated by a well bore having a temperature up to 400 degrees F (col. 12, line 41) comprising a viscous aqueous foamed fracturing fluid into the subterranean zone at a rate and pressure sufficient to fracture the zone, the fluid comprising salt water (col. 22, line 22), a water viscosity increasing terpolymer of 2-acrylamido-2-methylpropane-sulfonic acid (col. 20, lines 2-4), acrylamide (9 col. 16, line 20) and acrylic acid (col. 34, line 32), carbon dioxide (col. 1, lines 65-66), a foaming agent (col. 2, line 10) but not a viscosity breaker for effecting a controlled reduction in the viscosity of the fracturing fluid.

(Office Action at 4).

1. The Examiner Has Not Established a *Prima Facie* Case of Obviousness Because the Prior Art References Do Not Teach or Suggest Each and Every Claim Limitation.

To establish a *prima facie* case of obviousness, the prior art references must teach or suggest each and every claim limitation. See MPEP § 2142. Since the prior art references do not teach or suggest each and every claim limitation, Applicants respectfully submit that the Examiner has not established a *prima facie* case of obviousness with respect to claims 1, 2, 6, 7, 12, 13, 24, 25, 29, 30, and 36. See MPEP § 2142.

With respect to independent claim 1, the combination of *Stahl* and *Mitchell* does not teach or suggest each and every claim limitation. First, claim 1 recites the use of a “foamed fracturing fluid comprising . . . a water viscosity increasing terpolymer of 2-acrylamido-2-methylpropane sulfonic acid, acrylamide, and acrylic acid or salts thereof.” However, *Stahl* does not disclose the use of the recited terpolymer. Instead, *Stahl* is directed to “a novel process[] . . . comprising the introduction of *polymers comprising an N-vinyl lactam* and an unsaturated amide into a subterranean well bore . . . [and] novel methods . . . for the preparation of novel polymers of N-vinyl lactams.” (Stahl, col. 8, ll. 49-67) (emphasis added). In particular, the copolymers

and terpolymers disclosed in *Stahl* should have the “minimum amount of N-vinyl lactam comonomer . . . necessary to provide the desired polymer properties, e.g. viscosity and stability, under the expected environmental conditions.” (*Stahl*, col. 15, ll. 46-49). Nowhere does *Stahl* suggest or disclose a terpolymer of 2-acrylamido-2-methylpropane sulfonic acid, acrylamide, and acrylic acid or salts thereof. Nor can *Mitchell* be used to supply this missing limitation. Thus, the combination of *Stahl* and *Mitchell* does not teach or suggest the use of a terpolymer of 2-acrylamido-2-methylpropane sulfonic acid, acrylamide, and acrylic acid or salts thereof as recited in independent claim 1.

Further, independent claim 1 recites the step of “pumping a viscous aqueous foamed fracturing fluid into said subterranean zone at a rate and pressure sufficient to fracture said zone, said aqueous foamed fracturing fluid comprising . . . a gas [and] a foaming agent.” *Stahl* does not disclose this step. The Examiner asserts that *Stahl* “discloses a method of fracturing a subterranean zone . . . [using] a viscous aqueous foamed fracturing fluid . . . , the fluid comprising . . . carbon dioxide and a foaming agent” (Office Action at 3-4). While *Stahl* discusses the use of both carbon dioxide and foamed surfactants, *Stahl* does not teach or suggest pumping a viscous aqueous foamed fracturing fluid that comprises carbon dioxide and a foaming agent into a subterranean zone at a rate and pressure sufficient to fracture said zone. First, *Stahl* does not teach or suggest a viscous aqueous foamed fracturing fluid that comprises a gas (e.g., carbon dioxide). With respect to carbon dioxide, *Stahl* discusses the use of carbon dioxide as a flooding liquid used as a driving fluid in “enhanced” oil recovery techniques and does not teach or suggest a viscous aqueous foamed fracturing fluid that comprises carbon dioxide. (*Stahl*, col. 1, ll. 40-65). Nor does *Stahl* teach or suggest the use of an aqueous foamed fracturing fluid that comprises a foaming agent. The foam process described in *Stahl* is another enhanced oil recovery technique that involves the injection of steam into a reservoir followed by a hot aqueous surfactant composition. (*Stahl*, col. 2, ll. 13-29). This steam stimulation technique described in *Stahl* is a method used to heat the reservoir and stimulate production and does not teach or suggest the step of pumping a viscous aqueous foamed fracturing fluid into a subterranean zone at a rate and pressure sufficient to fracture said zone as recited in independent claim 1. Further, although not explicitly stated in *Stahl*, these enhanced oil recovery techniques, that utilize carbon dioxide or the surfactant composition should be performed at pressures below the fracture pressure of the formation to achieve the desired permeability correction and mobility

control. (*Stahl*, col. 1, ll. 40 to col. 2, ll. 12). Nor can *Mitchell* be used to supply the missing limitation. Thus, the combination of *Stahl* and *Mitchell* does not teach or suggest the step of pumping a viscous aqueous foamed fracturing fluid into said subterranean zone at a rate and pressure sufficient to fracture said zone as recited in independent claim 1.

Referring now to independent claim 24, the combination of *Stahl* and *Mitchell* does not teach or suggest each and every claim limitation. First, claim 24 recites “a viscous aqueous foamed fracturing fluid comprising . . . a terpolymer of 2-acrylamido-2-methylpropane sulfonic acid.” As discussed above with respect to claim 1, the combination of *Stahl* and *Mitchell* does not teach or suggest a terpolymer of 2-acrylamido-2-methylpropane sulfonic acid, acrylamide, and acrylic acid or salts thereof as recited in independent claim 1.

In addition, the foamed fracturing fluid recited in claim 24 also comprises “a gas; [and] a foaming agent.” With respect to these limitations, the Examiner asserts that *Stahl* discloses “a viscous aqueous foamed fracturing fluid . . . comprising . . . carbon dioxide and a foaming agent” (Office Action at 3-4). While *Stahl* discusses the use of both carbon dioxide and foamed surfactants, *Stahl* does not teach or suggest the combination of carbon dioxide and a foaming agent with the other components to formulate a viscous aqueous foamed fracturing fluid. With respect to carbon dioxide, *Stahl* discusses the use of carbon dioxide as a flooding liquid used as a driving fluid in “enhanced” oil recovery techniques and does not teach or suggest a viscous aqueous foamed fracturing fluid that comprises carbon dioxide and a foaming agent. (*Stahl*, col. 1, ll. 40-65). As for the foaming surfactants, *Stahl* discloses the injection of steam into a reservoir followed by a hot aqueous surfactant composition. (*Stahl*, col. 2, ll. 13-29). This steam stimulation technique described in *Stahl* is a method used to heat the reservoir and stimulate production and does not teach or suggest an aqueous foamed fracturing fluid that comprises carbon dioxide and a foaming agent as suggested by the Examiner. Nor can *Mitchell* be used to supply these missing limitations. Thus, the combination of *Stahl* and *Mitchell* does not teach or suggest a viscous aqueous foamed fracturing fluid comprising a gas and a foaming agent as recited in independent claim 24.

2. The 103(a) Rejection Over *Stahl* in View of *Mitchell* Should be Removed.

In light of the above arguments, independent claims 1 and 24 are not obvious over *Stahl* in view of *Mitchell* because the examiner has not established a *prima facie* case of obviousness in accordance with MPEP section 2142. Thus, independent claims 1 and 24 are

patentable over *Stahl* in view of *Mitchell*. Claims 2, 6, 7, 12, and 13 depend either directly or indirectly on independent claim 1. Claims 25, 29, 30, 35, and 36 depend either directly or indirectly on independent claim 24. All these dependent claims, which include all the limitations of their corresponding independent claims, are allowable for at least the reasons cited above with respect to independent claims 1 and 24. Accordingly, withdrawal of this rejection with respect to claims 1, 2, 6, 7, 12, 13, 24, 25, 29, 30, 35, and 36 is respectfully requested.

B. Claims 3, 4, 15, 16, 18-20, 26-28, and 38-43 Are Not Obvious Over *Stahl* in view of *Mitchell* and further in view of the *Funkhouser* Publication.

The Examiner has rejected “[c]laims 3, 4, 15, 16, 18-20, 26-28, and 38-43 under 35 U.S.C. 103(a) as being obvious over *Stahl et al.* in view of *Mitchell et al.* as applied to claims 1 and 24, respectively and further in view of *Funkhouser et al.*” (Office Action at 4).

As stated above, the present invention and the *Funkhouser* Publication were, at the time the invention of the present application was made, owned by, or subject to an obligation of assignment to, Halliburton Energy Services, Inc. Because of this common ownership, the *Funkhouser* Publication is disqualified as prior art under 35 U.S.C. 103 via 35 U.S.C. 102(e). See MPEP 706.02(I)(1). Accordingly, the Applicants respectfully request withdrawal of this rejection with respect to claims 3, 4, 15, 16, 18-20, 26-28, and 38-43.

V. Remarks Regarding Objection to Claims 5, 8-11, 14, 17, 31-34, and 37.

The Examiner has objected to claims 5, 8-11, 14, 17, 31-34, and 37 as being dependent upon a rejected base claim, but indicated that such claims would be allowable if rewritten in independent form. The Applicants gratefully acknowledge the Examiner’s indication of the allowability of these claims.

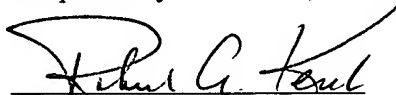
In light of the above remarks with regards to independent claims 1 and 24, such independent claims are patentable in view of the cited references. Claims 5, 8-11, 14, and 17 depend directly or indirectly on independent claim 1, and claims 31-34 and 37 depend directly or indirectly on independent claim 24. All these dependent claims, which include all the limitations of their corresponding independent claims, are allowable for at least the reasons cited above with respect to independent claims 1 and 24. Accordingly, the Applicants respectfully request withdrawal of this objection with respect to claims 5, 8-11, 14, 17, 31-34, and 37.

SUMMARY

In light of the above remarks and amendments, Applicants respectfully request reconsideration and withdrawal of the outstanding objections and rejections. Applicants further submit that the application is now in condition for allowance, and earnestly solicit timely notice of the same. Should the Examiner have any questions, comments or suggestions in furtherance of the prosecution of this application, the Examiner is invited to contact the attorney of record by telephone, facsimile, or electronic mail.

Applicants believe that no fees are due in association with the filing of this Response. However, should the Commissioner deem that any fees are due, including any fees for extensions of time, the Commissioner is authorized to debit Halliburton Energy Services, Inc. Deposit Account No. 08-0300 for any underpayment of fees that may be due in association with this filing.

Respectfully submitted,



Robert A. Kent
Reg. No. 28,626
Halliburton Energy Services, Inc.
2600 South Second Street
P.O. Drawer 1431
Duncan, OK 73536-0440
Houston, Texas 77002-4995
Telephone: 580.251.3125
ATTORNEY FOR APPLICANTS

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